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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/650,344	08/28/2003	Sung-Yung Lee	5649-1162	6659
7590	01/27/2006		EXAMINER	
Julie H. Richardson, Esq. Myers Bigel Sibley & Sajovec, P.A. P. O. Box 37428 Raleigh, NC 27627				QUINTO, KEVIN V
		ART UNIT		PAPER NUMBER
		2826		

DATE MAILED: 01/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>
	10/650,344	LEE ET AL. <i>(PM)</i>
	<b>Examiner</b>	<b>Art Unit</b>
	Kevin Quinto	2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 14 November 2005.
- 2a) This action is FINAL.                            2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-3,5-20,33,34,36-38,44 and 45 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) 10-20,33-35,38,44 and 45 is/are allowed.
- 6) Claim(s) 1-3,5-9,36 and 37 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) All    b) Some \* c) None of:
  1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>16 December 2004</u> + <u>21 May 2004</u> | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|  | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### ***Response to Arguments***

1. Applicant's arguments filed November 14, 2005 have been fully considered but they are not persuasive. The applicant presented arguments concerning the dielectric film (15) of the Okudaira reference (USPN 5,459,345). The applicant has defined "conformal" as having the "general shape of or follows the shape of the underlying structure." However figure 15 of Okudaira clearly shows that the dielectric film (15) meets the definition stated by the applicant. As to the argument concerning whether or not the dielectric film (15) of Okudaira is a "film," the applicant does not cite or claim a thickness or tolerance which determines whether or not a structure is a film. The Okudaira reference is used in combination with Chien (USPN 6,001,682) to reject claims 1-3, 5-9, 36, and 37 under 35 U.S.C. 103(a) (see below section titled *Claim Rejections – 35 USC § 103*).
2. Applicant's arguments with respect to claims 36 and 37 have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-3, 5-9, 36, and 37 are rejected under 35 U.S.C. 103(a) as being anticipated by Okudaira et al. (USPN 5,459,345) in view of Chien (USPN 6,001,682).
5. In reference to claim 1, Okudaira et al. (USPN 5,459,345, hereinafter referred to as the "Okudaira" reference) discloses a similar device. Figure 15 of Okudaira discloses an interlayer dielectric (101) formed on a semiconductor substrate (31). A buried contact plug (9a) extends a distance through the interlayer dielectric (101) to be in electrical communication with a predetermined region of the semiconductor substrate (31). An oxidation barrier pattern (11) made of titanium nitride is disposed on a top surface of the buried contact plug (9a). A lower electrode (13) is disposed on the oxidation barrier pattern (11). A top surface area of the oxidation barrier pattern (11) is substantially equal to a bottom surface area of the lower electrode (13). The lower electrode (13) includes an external sidewall and the oxidation barrier pattern (11) includes a sidewall such that the external sidewall of the lower electrode (13) and the sidewall of the oxidation barrier pattern (11) are aligned in a substantially straight line. A dielectric film (15) is disposed over the lower electrode sidewalls such that the dielectric film (15) conforms to the lower electrode sidewall and the oxidation barrier sidewall in a substantially straight line orientation. The lower electrode (13) of Okudaira in figure 15 has a closed surface bottom disposed on the oxidation barrier pattern (11). Okudaira teaches all of the claimed invention except for a lower electrode with a cross-sectional shape that includes spaced apart extending parts which define an inner cavity portion or cylindrically-shaped. However the use of cylindrically shaped electrodes is well known in the art. Chien (USPN 6,001,682) discloses that a cylindrically shaped

electrode, such as the one in figure 3A-3D, increases the effective surface area of the electrode (column 2, lines 48-50). The cylindrically shaped electrode of Chien includes a cross-sectional shape that includes spaced apart extending parts which define an inner cavity portion. Chien further discloses that increasing the surface area of the capacitor electrode within a given surface area is desirable in order to obtain a higher level of integration which is desirable in the art (column 1, lines 20-47). In view of Chien, it would therefore be obvious to use a cylindrically shaped capacitor electrode in the device of Okudaira.

6. With regard to claim 2, the oxidation barrier pattern (11) comprises a metal nitride (column 4, lines 24-26).

7. In reference to claim 3, the lower electrode (13) of Okudaira meets the claim (column 14, lines 22-23).

8. In reference to claim 5, an upper electrode (17) is disposed over the lower electrode (13). The dielectric film (15) is interposed between the lower electrode (13) and the upper electrode (17) thus forming a capacitor. The oxidation barrier pattern (11) is coextensive with a bottom of the lower electrode (13).

9. With regard to claim 6, Okudaira also discloses (claim 4, column 21, lines 11-14, and column 22, lines 1-4) that the dielectric film (15) may also be made of PLZT, PZT, STO,  $Ta_2O_5$ , or BTO. Huang (USPN 6,353,269 B1) discloses that ONO has a dielectric constant between 13 and 14 (column 6, lines 38-40). Krivokapic (USPN 6,452,229 B1) discloses that the dielectric constants of PZT, STO,  $Ta_2O_5$ , or BTO are greater than 14 (columns 8 and 9, Table I). Furthermore Yunogami et al. (United States Patent

Application Publication No. US 2001/0006245 A1) discloses that PLZT has a dielectric constant greater than 100 (p.1, paragraph 6). Therefore Okudaira meets the claim.

10. In reference to claim 7, the dielectric film (15) is made of PZT, which the applicant has characterized as being a ferroelectric substance (p.8, lines 29-31 of applicant's current specification). Okudaira also discloses (claim 4, column 21, lines 11-14, and column 22, lines 1-4) that the dielectric film (15) may also be made of PLZT, STO, or BTO, which are all known ferroelectric substances (see Kubota et al., United States Patent Application No. US 2002/0008724 A1, p. 25, paragraph 325), thus meeting the claim. Okudaira also discloses (claim 4, column 21, lines 11-14, and column 22, lines 1-4) that the dielectric film (15) may also be made of BST, which is a known ferroelectric substance (see Leung et al., USPN 5,563,762, column 1, lines 46-50), thus meeting the claim.

11. In reference to claim 8, the upper electrode (17) of Okudaira meets the claim (column 14, lines 37-39).

12. With regard to claim 9, figure 15 of Okudaira shows a transistor which is connected to the oxidation barrier pattern (11) thus forming a memory cell.

13. With regard to claim 36, the lower electrode (13) of Okudaira in figure 15 has a closed surface bottom disposed on the oxidation barrier pattern (11). The closed bottom surface is disposed on and is coextensive with the oxidation barrier pattern (11). In the device of Okudaira constructed in view of Chien, the dielectric film (15) defines a continuous surface between an upper electrode (17) and the lower electrode (13) and

conformably resides against the surfaces defining the cavity of the lower electrode (13) while a portion of the upper electrode (17) fills the cavity of the lower electrode (13).

14. With regard to claim 37, the device of Okudaira constructed in view of Chien has spaced apart extending parts which are configured as two substantially parallel spaced apart upwardly extending sidewalls.

***Allowable Subject Matter***

15. Claims 10-20, 33, 34, 35, 38, 44, and 45 were allowed in a previous Office action.

***Conclusion***

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quinto whose telephone number is (571) 272-1920. The examiner can normally be reached on M-F 8AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (571) 272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306 but starting on July 15, 2005, the new fax phone number will be (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KVQ



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